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CHARACTERIZATION OF MELTING LEVEL CLOUDS OVER THE TROPICAL WESTERN PACIFIC WARM POOL

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ABSTRACT

A cursory examination of historical ARSCL data indicates a common cloud feature in the tropics are thin detrainment shelves (Attendant Shelf Clouds, or ASCs) near the melting level (see figure for example). We use the ARSCL product to identify ASCs by defining them as cloud layers with bases above 4 km, a corresponding top below 6 km, and a thickness of less than 1 km. In order to prevent biases in determination of the diurnal cycle of cloud occurrence, we require that both the MMCR and MPL are operating well. In this study we use a total of 55 months of data collected over 14 years of deployments at the Manus, Nauru, and Darwin ARM sites in the Tropical Western Pacific to define the frequency of occurrence (~ 14% of the time) and diurnal cycle of these clouds, along with the atmospheric thermodynamic profile. We further investigate the horizontal extent, cloud radiative forcing, and cloud particle phase through a series of "golden cases" where there is a general absence of additional cloud types in the column and nearby deep convection. These cases indicate that the clouds can cover horizontal areas on the order of a GCM gridbox, have significant (but not always) cloud radiative forcing, and may be composed of liquid or ice water.

This poster will be displayed at ASR Science Team Meeting.